Roading from an Aerial Perspective

Presented by:

James McCallum
Roading Engineer
Southland District Council
1. Introduction
2. Aerial Imagery
3. Software
4. Orthomosaics
5. Survey
6. Construction Management
7. Safety
8. Community Engagement
9. Limitations and Restrictions
1. INTRODUCTION

The Southland District at a glance...

Southland District is the second largest TLA in NZ by road km’s (second only to the now amalgamated Auckland Super City)

- 3,000km unsealed roads
- 2,000km sealed roads
- 1,200+ road related structures

Southland District covers approx. 13% of NZ land mass

- Geographically it varies greatly
- Challenging (erosion, slips, heavy traffic demand)
- 30,000 residents
1. INTRODUCTION

Types of drone’s available and what SDC currently use:

- **< $1,000**  
  **Toy Range**

- **$2,000 - $3,000**  
  **Mid Range Consumer**

- **$5,000 +**  
  **High End Consumer**

- **$8,000 - $10,000 +**  
  **Commercial**

You don’t need to spend a lot to see the benefits.
2. AERIAL IMAGERY

Examples:

- Slip monitoring
- Bridge/structures
- Erosion monitoring
- Construction management
- Consent monitoring
- Quarry management
- Vegetation Management
2. AERIAL IMAGERY

Examples:

- Slip monitoring
- Bridge/structures
- Erosion monitoring
- Construction management
- Consent monitoring
- Quarry management
- Vegetation Management
2. AERIAL IMAGERY

Examples:

- Slip monitoring
- Bridge/structures
- Erosion monitoring
- Construction management
- Consent monitoring
- Quarry management
- Vegetation Management
2. AERIAL IMAGERY

Examples:

- Slip monitoring
- Bridge/structures
- Erosion monitoring
- Construction management
- Consent monitoring
- Quarry management
- Vegetation Management
2. AERIAL IMAGERY

Examples:

- Slip monitoring
- Bridge/structures
- Erosion monitoring
- Construction management
- Consent monitoring
- Quarry management
- Vegetation Management
2. AERIAL IMAGERY

Examples:

- Slip monitoring
- Bridge/structures
- Erosion monitoring
- Construction management
- Consent monitoring
- Quarry management
- Vegetation Management
3. SOFTWARE

How it works...

Raw Data  ➔  Processing Software  ➔  Outputs

Technical Outputs from Simple Images
4. ORTHOMOSAICS

Cosy Nook – Coastal Protection Works
4. ORTHOMOSAICS

Cosy Nook – Coastal Protection Works
4. ORTHOMOSAICS

Cosy Nook – Coastal Protection Works
5. SURVEY

Point cloud → Create surface and sections with endless design potential

Overview of surface + point cloud

C3D Surface created
5. SURVEY

Curio Bay Heritage Area Development

Development of Heritage Centre and Car Parking

- Some areas missed in the original topo survey
- Under 30 minutes, covered over 1.5km
- 3D Point Cloud model of site and HD images of site used in design
- Sensitive wildlife environment (sea lions, penguins etc)
5. SURVEY

Brydone Glencoe Road – Slip Investigation
5. SURVEY

Brydone Glencoe Road – Slip Investigation

- Doesn’t look like big a problem, but its not going away
- Continually topped up, keeps slumping over number of years
- ADT of 120 (23% Heavies = 28/day)
- $1 Million + for full repair in current location
- Alternative options being considered
- One alternative required an exploratory survey
5. SURVEY

- 1.5 hours on site, 5km length
- Orthomosaic and point cloud
- Loaded into CAD
- Exploratory design can be completed
5. SURVEY

Comparing Point Clouds (surfaces) - October 2015 and July 2016

- Monitoring consent conditions
- Measure any detrimental effects caused by protection structure
- Rich virtual 3D environment for viewing and showing stakeholders
5. SURVEY

A useful tool for stockpile measurement and recording

- Accurate
- Fast
- Repeatable
- Cost effective
- Can done in specialist software or Autodesk Civil 3D
6. CONSTRUCTION MANAGEMENT

Branxholme Plant – Aerial Monitoring
6. CONSTRUCTION MANAGEMENT

Branxholme Plant - Orthomosaic
7. SAFETY

Intersection Review

- Less than 5 minutes to capture
- Fast analysis of pavement surface
- Create sections and design
- Up to date aerial photos to assist design
- Cost savings
- Repeatable
7. SAFETY

- Up to date imagery
- Improved imagery
- Quick results
- Easy to incorporate into design
8. COMMUNITY ENGAGEMENT

Road closure at the Catlins

A slip has forced the closure of section of the Catlins Highway

Gore and Southland District Councils to consult on bridge replacement

The Pyramid Bridge, which is to be replaced.

COUNCIL TAKES TO THE SKY AS PART OF ROADWORK

Southland District Council is taking an innovative approach to managing impacts on the road network by getting a high resolution aerial view through the use of a drone.

Road Engineer James McCallum said Council has been using a drone for more than an acre to assist in road works.

"We use a couple of trees a week for a range of applications including aerial surveying and photography, reviewing effects of weather events such as flooding, slips and coastal errosion, reviewing damages and keeping records. It takes both video and still images. It’s a really great tool for us to use.”

Earlier this year Council undertook a trial using borrowed equipment after this proved successful, a drone was purchased.

It saves time and money, and provides up-to-date information with high-quality, clear imagery. Council has been supplied to external consultants, saving time and money for site inspections and improving Council’s service responses, he said.

Previously aerial photos were only available from flowers by aircraft, usually undertaken every few years. The drone unit was inexpensive in comparison.

Council Road Engineer Joe Bouque said the ability to send digital footage to an aviation geotechnical engineer was faster and cheaper.

"Doing this in just two years recently saved Council the cost of the drone, several times over.”

A large percentage of the Council’s road network is outside of controlled airspace so staff can use the drone extensively, allowing extensive coverage across the network.

"It’s a really good use of innovation. The Southland District Council was one of the first councils in New Zealand to purchase and utilise this technology, providing value for money road services to the region,” Mr Bouque said.
8. COMMUNITY ENGAGEMENT

A powerful tool for getting information to customers

These images offer a whole new perspective to the customer of issues happening on the roading network

Also the ability to capture video footage in high definition (up to 4k)

Images and footage can be circulated via:

- Social media (Facebook)
- SDC website
- Newspapers
- Council newsletters
- Council reports
9. LIMITATIONS AND RESTRICTIONS

There are rules to follow!
9. LIMITATIONS AND RESTRICTIONS

Limitations

- Weather
  - Rain (No Rain)
  - Wind (<20km/hr)

- No Fly Zones
  - Controlled airspace, low flying zones etc (CAA NZ permit system can help you around this)
  - Private land (permission needed)

Restrictions

CAA NZ rules always apply (penalties and fines if not obeyed)
End of Presentation